
Materials Management

Lab Lead Engineers Office
Materials & Processes Laboratory
Ben Henrie



MAPTIS



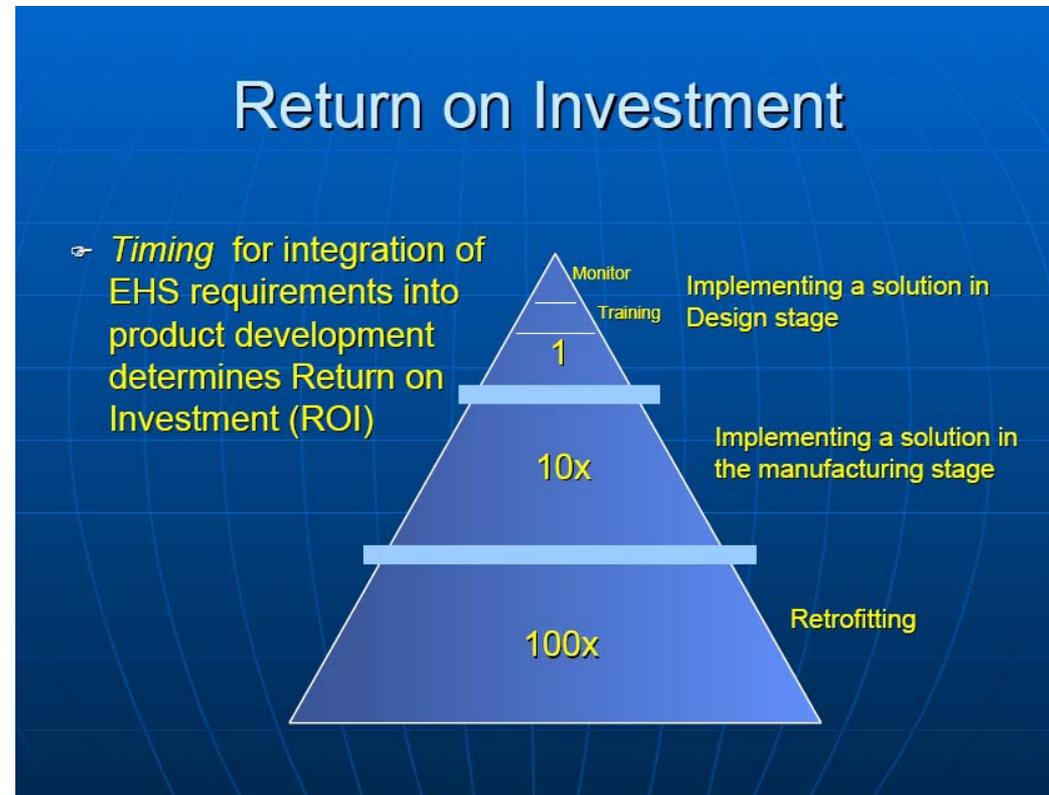
<http://maptis.nasa.gov>

- **MAPTIS was developed as a single point source for NASA for the purpose of acquiring, archiving and disseminating materials information throughout a product life cycle**
- **Global User Base**
 - **NASA (Space Station, Shuttle, Constellation, all flight hardware)**
 - **Army Research Laboratory**
 - **Japan Aerospace Exploration Agency**
 - **European Space Agency**
 - **Russian Federal Space Agency**
 - **Aerospace Companies, Universities, and others...**

Goal



- To provide the Design Engineer with the ability to consider Material Restrictions and Regulations during material selection



Material Selection List



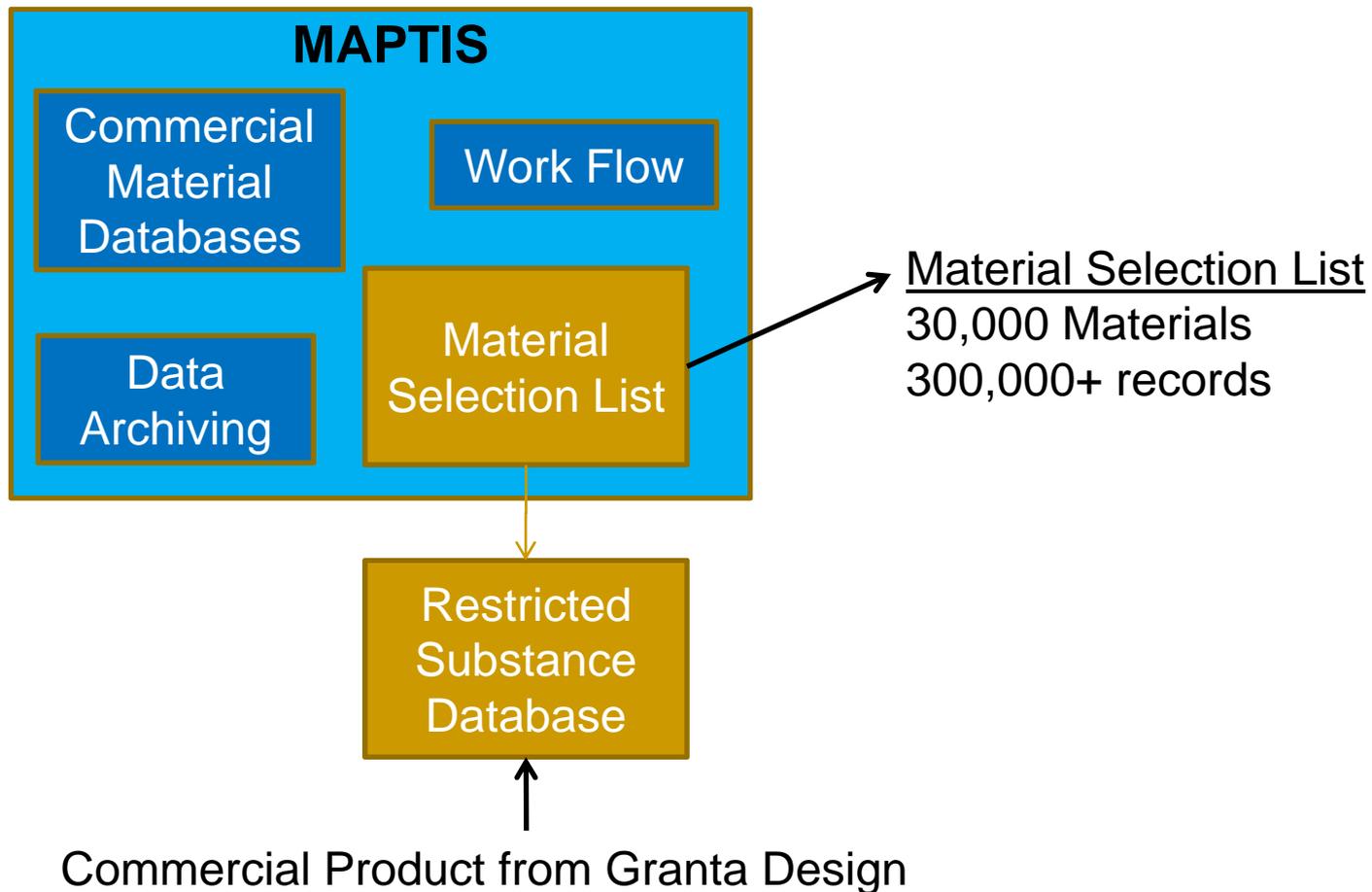
- The Selection List contains ~30,000 materials (metals and non-metals)
 - Each material is assigned a unique identification number
 - Once material test data has been analyzed and approved the results are added to the Selection List
 - This List contains data for use in Design Allowables
-

Material Selection List



- Arc Tracking
- Corrosion
- Crack Growth
- Creep Rupture
- Electrical Overload
- Electrical Wire Insulation
- Flammability
- Flash Fire
- Fluid Compatibility
- Frictional Heat
- Fungi
- High Cycle Fatigue
- Low Cycle Fatigue
- Mechanical Impact
- Odor
- Outgassing (TVS)
- Particle Impact
- Pneumatic Impact
- Promoted Ignition
- Stress Corrosion
- Toxicity
- (VCM) Optical

Material Selection List



Material Restrictions and Regulations into MAPTIS



- With the globalization of suppliers we cannot ignore the impact of other countries' material regulations
- MAPTIS is integrating a Restricted Substance Database from Granta Design
 - This Database provides ES&H regulations from many countries and is updated quarterly

United States Environmental Regulations



- Clean Air Act (CAA), List of Substances for Accidental Release Prevention
 - Phase-out of Class I Ozone-Depleting Substances
 - Phase-out of Class II Ozone-Depleting Substances
 - NESHAP for Stationary Combustion Turbines
 - NESHAP for Stationary Reciprocating Internal Combustion Engines
 - CERCLA/SARA/EPCRA
 - Emergency Planning and Community-Right-to-Know Act (EPCRA), Section 302, EHS TPQ
 - Emergency Planning and Community-Right-to-Know Act (EPCRA), Section 313 TRI
 - Emergency Planning and Community-Right-to-Know Act (EPCRA), Section 304, EHS RQ
 - Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Superfund
 - National Toxicology Program (NTP) - Report on Carcinogens (RoC)
 - National Waste Minimization Program - Priority Chemicals
 - Persistent Organic Pollutants list (POP)
 - Severely restricted pesticides, The Prior Informed Consent (PIC)
 - US Department of Homeland Security (DHS) - Chemicals of Concern (CoC)
 - US EPA 33/50 Program (EPA 17 materials)
-

Europe



- EC Regulation 2037/2000 (Ozone Depletion)
- EU Directive 1996/82/EC (Sevesco II – EU Directive 2003/105/EC)
- EU Directive 1999/13/EC (Solvent Emissions Directive – VOC) – Directive 2004/42/EC
- EU Directive 2000/53 (ELV)
- EU Directive 2002/95/EC (RoHS)
- EU Directive 2002/96/EC (WEEE)
- EU Directive 2005/32/EC (EuP)
- EU Proposed directive COM2004(320)
- ASD/SAE-STAN 9536
- REACH
 - Annex XIV – Authorisation List
 - Annex XV – SVHCs
 - Annex XVII – Restrictions
 - EINECS List
 - ELINCS List
 - Pre-registration
 - Registry of Intentions
 - Candidate List

Other Regulations



- Asia
 - China RoHS

 - Updates
 - The database is updated quarterly
-

Searching For Materials



Material Selection List

[MAPTIS-II](#) [Home](#) [Search](#) [Help](#)

Modify Search \

I am looking for

Search Criteria

General Definitions

Maptis Material Code:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Designation:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Composition:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Use Type:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Specification:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Manufacturer:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Test Report Number:	<input type="text"/>	<input type="button" value="Add Criteria"/>

Arc Tracking

Electrical Overload

Electrical Wire Insulation

Flammability

Flash Fire

Fluid Compatibility

Fungi

Mechanical Impact

Odor

Add Search Criterion



Material Selection List

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Modify Search \

I am looking for

Search Criteria

- Flammability Rating [▲](#) 3881 records
- Space Shuttle Rating [▲](#) 4736 records
- Electrical Overload Rating [▲](#) 61 records

11 records

General Definitions

Maptis Material Code:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Designation:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Composition:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Use Type:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Specification:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Manufacturer:	<input type="text"/>	<input type="button" value="Add Criteria"/>
Test Report Number:	<input type="text"/>	<input type="button" value="Add Criteria"/>

Arc Tracking

Electrical Overload

Rating:	<input type="text" value="A"/>	<input type="button" value="Add Criteria"/>
Oxygen Concentration:	<input type="text"/> to <input type="text"/>	<input type="button" value="Add Criteria"/>
Pressure	<input type="text"/> to <input type="text"/>	<input type="button" value="Add Criteria"/>

Material Record



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[Mech Impact](#) [Odor](#) [Outgassing \(TVS\)](#) [Pneu Impact](#) [Promoted Ignition](#) [Promoted Combustion](#) [Toxicity](#) [VCMO](#)
[Material Restrictions and Regs.](#) [Manufacturers](#)

Material Definition Properties:

Material Code: 04662

Designation: DURAFLECT* WHITE REFLECTANCE

Composition: METHYL ETHYL KETONE (MEK) WITH TOLUENE BARIUM
SULFATE POLYTETRAFLUOROETHYLENE (PTFE) XYLENE
4-METHYL-2-PENTANONE (MIBK) AND CELLOSOLVE
ACETATE

Use Type: COATING OPTICAL

Use Temp Min(F):

Use Temp Max(F):

Remarks:

Type	Seq.	Remarks
TM	1	DURAFLECT IS A REGISTERED TRADEMARK OF LABSPHERE INCORPORATED

Material Specification Data:

*** No Specifications for this Entry ***

Manufacturer Cure Information:

*** No Cure Data for this Entry ***

Material Restrictions



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4-METHYL-2-PENTANONE (MIBK) AND CELLOSOLVE
ACETATE

Use Type: COATING OPTICAL

Use Temp Min(F):

Use Temp Max(F):

Material Restrictions and Regulations Rating:

Rating: To be phased-out

Material Restrictions and Regulations Details:

Substance	Rating
Chloroform [67-66-3]	To be phased-out
Methyl ethyl ketone [78-93-3]	To be phased-out
Methyl isobutyl ketone [108-10-1]	To be phased-out
Toluene [108-88-3]	To be phased-out
Xylene (mixed isomers) [1330-20-7]	Regulated

Restriction Rating



- Lets designers know what regulatory impact a material has or may have:
 - **Banned** – No longer produced
 - **To be Phased Out** – Banned in 2015
 - **Regulated** – Current regulations
 - **Caution** – Proposed regulations
 - **Unregulated** – no regulations
-

Example of How Ratings Are Calculated



■ Duraflect White Reflectance

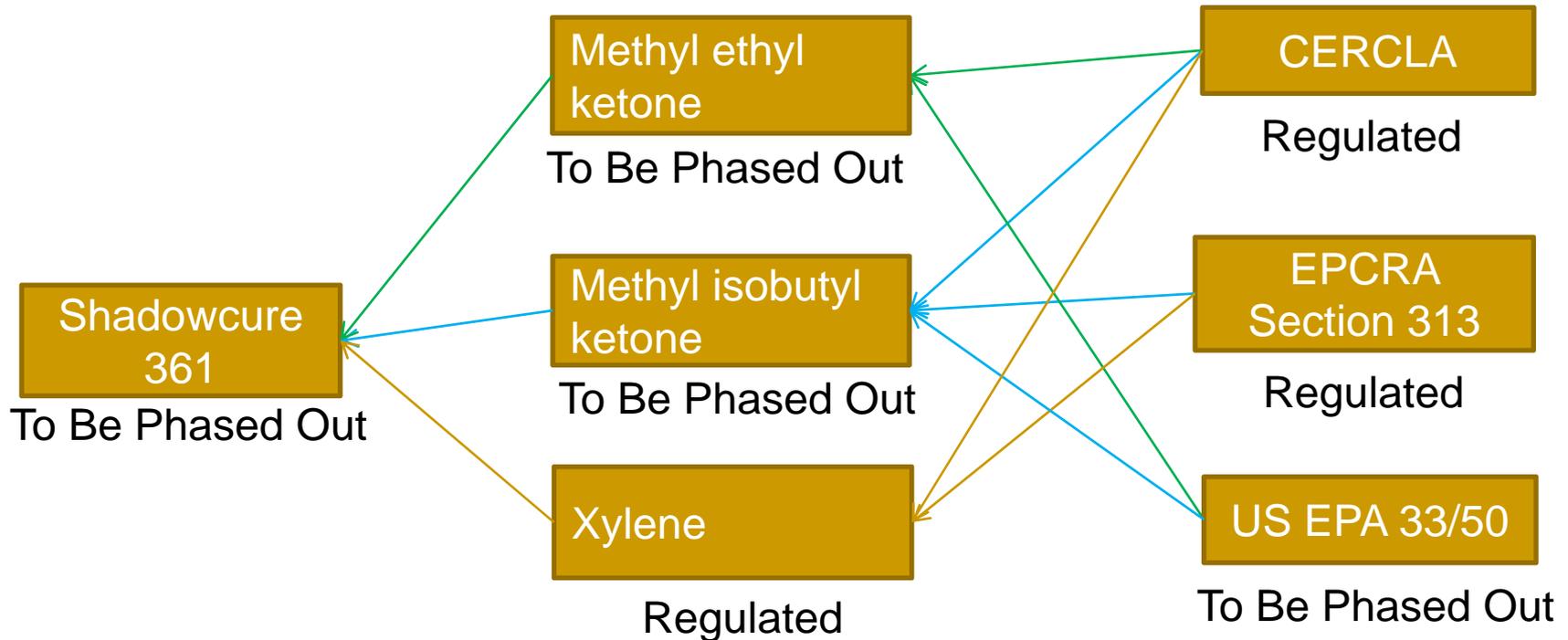
- Made by Labsphere Inc.
 - Composition
 - Methyl Ethyl Ketone (MEK)
 - Toluene
 - Barium Sulfate
 - Polytetrafluoroethylene (PTFE)
 - Chloroform – May Contain
 - Xylene
 - 4-Methyl-2-Pentanone (MIBK)
 - Cellosolve Acetate
-

Substance Restrictions



- Methyl ethyl ketone
 - CAS No: 78-93-3
 - Health: Toxic
 - Methyl isobutyl ketone
 - CAS No: 108-10-1
 - Health: Harmful
 - Xylene
 - CAS No: 1330-20-7
 - Health: Harmful
-

Automatic Ratings



One material may be linked on multiple pieces of regulations

Material Restrictions



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ACETATE

Use Type: COATING OPTICAL

Use Temp Min(F):

Use Temp Max(F):

Material Restrictions and Regulations Rating:

Rating: To be phased-out

Material Restrictions and Regulations Details:

Substance	Rating
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Methyl isobutyl ketone [108-10-1]	To be phased-out
Toluene [108-88-3]	To be phased-out
Xylene (mixed isomers) [1330-20-7]	Regulated

Substance Record



View ▾ Navigate ▾ Tools ▾ Units ▾ Help ▾



Toluene [108-88-3]

Restricted Substances Database > Restricted Substances (Restricted Substances) [Change Layout](#) ▾

Click on a heading to show/hide the section.

Sections: [Show](#) | [Hide](#)

— General Information

Rating	To be phased-out
Chemical name	Toluene
CAS number	108883
CAS number (delimited)	108-88-3
EC number	203-625-9
Name index	TOLUENE
Chemical family	FAMBenzene
Molecular formula	C7H8
Common formula	C6H5CH3
Synonyms	methylbenzene, phenylmethane, toluol, antisal 1A, CP 25, methacide, methylbenzol, NCI-C07272, RCRA waste number U220, tolu-sol
Colour of the substance	colourless
Smell of the substance	benzene-like odour
Last updated	March 24 2009

— REACH information

Has that substance been pre-registered?	Yes
Is this substance a SVHC under Annex XV?	No
Annex I index number (67/548/EEC)	601-021-00-3

— Environment, Health and Safety Impacts

Health	Harmful
Safety	Highly Flammable
Risk phrases	1/11/2020
Safety phrases	(2-)16-25-29-33

— Uses

Typical process Lab test, Thinner, solvent carrier

Typical uses

Aviation gasoline and high-octane blending stock; benzene, phenol, and caprolactam; solvent for paints and coatings, gums, resins, most oils, rubber, vinyl organosols; dilue solvent in plastic toys and model airplanes; chemicals (benzoic acid, benzyl and benzoyl derivatives, saccharin, medicines, dyes, perfumes); source of toluenediisocyanates sulfonates (detergents); scintillation counters.

Legislation



Legislations restricting its use

Legislation name	Legislation rating	Amount (lb)	Geographical area	Form
CERCLA hazardous substances	Regulated	> 1000	US	
EU Proposed directive COM2004(320)	To be phased-out		EU	adhesives and spray paints containing in excess of 0.1% toluene
US EPA 33/50 Program (EPA 17 materials)	To be phased-out		US	
The EPA's List of Lists (LoL)	Unspecified		US	
REACH Pre-registration	Caution		EU	
EU Proposed directive COM2004(320)	To be phased-out		EU	adhesives and spray paints containing in excess of 0.1% toluene
EPCRA Section 313, Toxic Chemicals	Regulated	> 10000	US	For most TRI chemicals, the thresholds are 25,000 pound manufac
NESHAP for Stationary Combustion Turbines	Regulated		US	
SAE AS9535 Declarable Substances	Caution		Worldwide	
US Air Toxics Regulations (NESHAP)	Regulated		US	The applying HAP limits are different according to the area source
REACH (Registration, Evaluation and Authorisation of Chemicals)	Unspecified		EU	

— Materials containing this substance

MAPTIS Materials that may contain this substance 62 Directly Linked Records [Show All As On Datasheet](#)

Granta provides no warranty for the accuracy of this data

Material Restrictions



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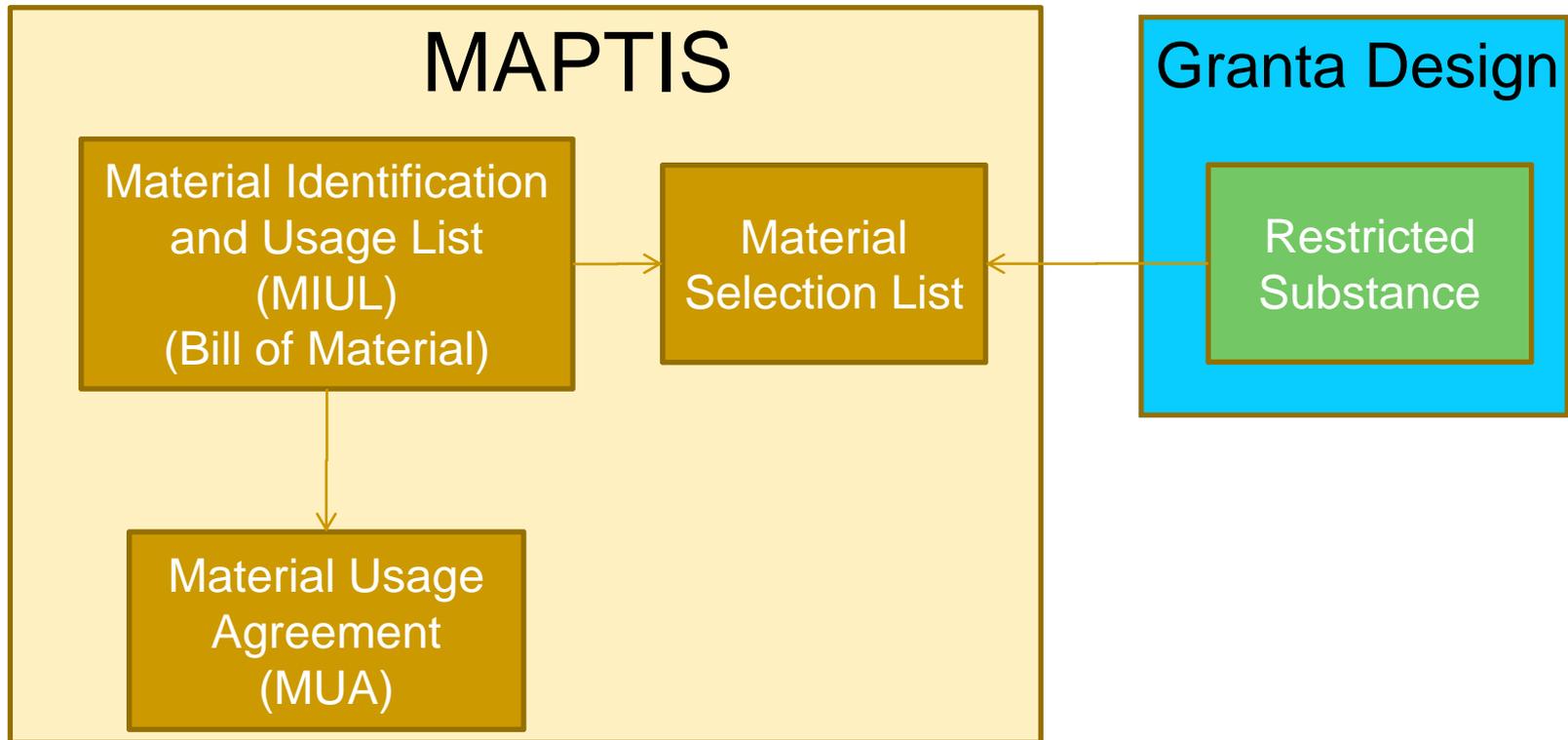
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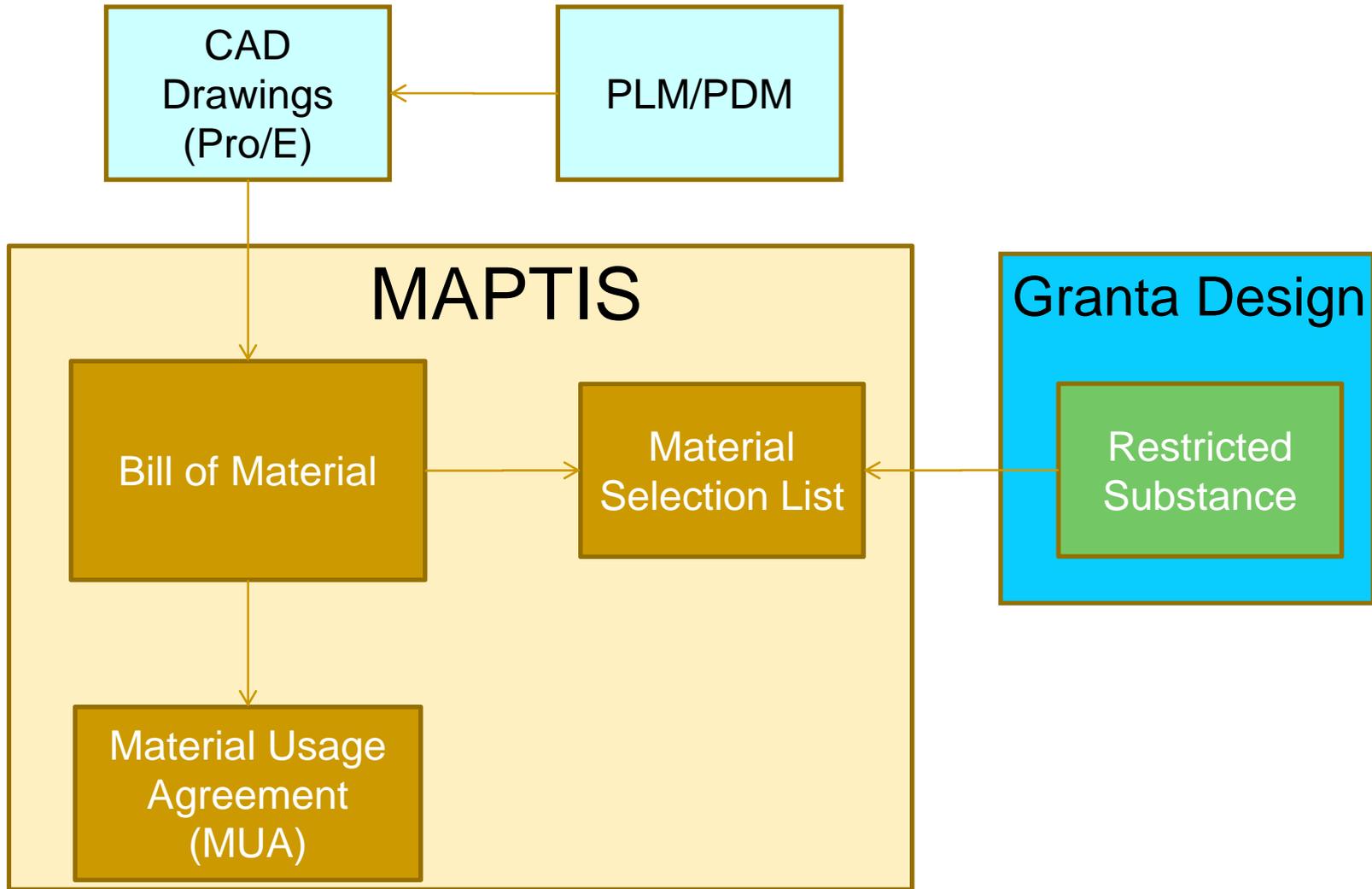
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Bill of Materials



2nd Year Work – Next Step



Future Work



UGS Teamcenter

Granta MI

Getting Started | My Teamcenter | *PSE | Granta MI

Enter Item ID to Search

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- My Saved Searches
- My Links

Open Items

History

- A1200/A;1-Rear Assy

Getting Started

My Teamcenter

PSE

Schedule Manager

CAE SE

Validation

Granta MI

StructureMap Builder

Granta MI integration for Teamcenter

REACH Report

Product structure with materials information

- A1200/A;1-Rear Assy (view) x 1
 - A1100-I/A;1-Wheel Attachment Assy, left (view) x 1
 - A1020-I/A;1-Wheel Assy, left (view) x 1
 - 4851-2/A;1-U-joint x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 4853/A;1-Stub axle x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 2754/A;1-Stub axle pin x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 4354-I/A;1-Stub axle carrier, left x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 5116/A;1-Ball bearing, 5x11x4 x 1
 - Low alloy steel, AISI 9310 (normalised) **Unregulated**
 - 1654-1/A;1-Wheel hub x 1
 - Cast magnesium alloy (AM50) **Unregulated**
 - 4872/A;1-Wheel x 1
 - Nitrile Rubber (NBR) **Regulated**
 - 4873-I/A;1-Tyre, left x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 1747X/A;1-Nut, 4 x 1
 - Low alloy steel, AISI 4037 (tempered @ 205 C, oil quenched) **Unregulated**
 - A1030/A;1-Upper Camber Rod Assy (view) x 1
 - 2742X-1/A;1-Rod end x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 4841-1/A;1-Upper camber rod x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 2553/A;1-Screw, 3x15 CS M (HD) x 1
 - Low alloy steel, AISI 9310 (normalised) **Unregulated**
 - 2742X-2/A;1-Hollow ball x 1
 - Epoxy SMC (Carbon Fibre) **To be phased out**
 - 4850-I/A;1-Suspension arm, rear, left x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 4838-2/A;1-Suspension screw, 3x40 x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 4838-1/A;1-Suspension screw, 3x26 x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 4260/A;1-Shock Absorber Assy (view) x 1
 - 3767-1/A;1-Shock Cap x 1
 - Carbon steel, AISI 1015 (normalised) **Unregulated**
 - 1765/A;1-Silicone diaphragm x 1
 - Eccosil 4122 (SIL) - Silicone Elastomer **Unregulated**
 - 3768-2/A;1-Piston head 2-hole (view) x 1
 - Wrought aluminium alloy, 2519, T87 **Unregulated**
 - 4262T/A;1-Shock shaft x 1
 - Low alloy steel, AISI 9310 (normalised) **Unregulated**
 - 3764A/A;1-Body, Ultra Shock x 1
 - Carbon steel, AISI 1015 (normalised) **Unregulated**
 - 3769/A;1-Spring pre-load spacer x 1
 - Low alloy steel, AISI 9310 (normalised) **Unregulated**
 - 3768-1-1/A;1-Spring retainer, upper (view) x 1
 - Low alloy steel, AISI 9310 (normalised) **Unregulated**
 - 2362/A;1-Shock washers x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 3767-2/A;1-Shock bottom x 1
 - Carbon steel, AISI 1015 (normalised) **Unregulated**
 - 4267/A;1-Spring x 1
 - Low alloy steel, AISI 9255 (annealed) **Unregulated**
 - 2362/A;1-Shock washers x 1
 - Low alloy steel, AISI 31 40 (normalised) **Unregulated**
 - 3768-1-2/A;1-Spring retainer, lower x 1
 - Low alloy steel, AISI 9310 (normalised) **Unregulated**
 - 1942-1/A;1-Rod end x 1
 - Low alloy steel, AISI 4037 (tempered @ 205 C, oil quenched) **Unregulated**

Other Future Work



- Substitution
- Emerging Regulations
- Supplier Declarations
- The list is growing...

Environmental Materials



Information Consortium (EMIT)

■ Partners

- Granta Design
- Rolls Royce
- NASA
- Eurocopter
- Emerson
- Army Research Laboratory

■ Supplier Declarations

■ Reach

■ And other areas

Army Research Laboratory



- Space Act Agreement has been signed
 - Agreement is for ARL to use MAPTIS to better distribute material data
 - Further goals are to integrate the restricted substance database
-

Summary



- Emerging Regulations, we need information
 - The restricted substance database can be connected to other systems
 - The Navy is showing some interest in this project
 - Supplier Declarations, it would be great if every material that NASA purchased required disclosure
-